

WATERSHED MANAGEMENT AREA 9

LOWER RARITAN RIVER DRAINAGE

The watershed management area includes watersheds draining the lower portion of Raritan River and includes the South River and Lawrence Brook. The Area lies mostly in Middlesex and Somerset and Monmouth Counties and includes the following watersheds:

Mainstem Raritan River
Manalapan River

South River

Lawrence Brook
Matchaponix Brook

Summary of ambient physical/chemical monitoring stations and classifications

Station

Classification

Raritan River at Manville	FW-2 Nontrout
Raritan R. at Queens Bridge (Bound Brook)	FW-2. Nontrout
Manalapan Brook near Manalapan	FW-2 Nontrout
Manalapan Brook at Spotswood	FW-2 Nontrout

Note: Monitoring at Raritan River at Raritan (FW-2 Nontrout) and Matchaponix Brook at Spotswood (FW-2 Nontrout) was discontinued in 1991.

OVERALL MANAGEMENT AREA ASSESSMENT

- Swimmable Support Status:

WATERWAY

LOCATION

STATUS

Raritan River	at Manville	Full Support
Raritan R.	Queens Bridge (Bound Brook)	No Support
Manalapan Brook	near Manalapan	Full Support
Matchaponix Brook	at Spotswood	Full Support

- **Summary of Aquatic Life Support Status (Number of stations within each assessment category).** Note: See the Biological Assessment Table located at the end of this section for details regarding macroinvertebrate assessments within the watershed management area.

No Impairment: 3

Mod. Impairment: 33

Severe Impairment: 6

MAPS here

RARITAN RIVER MAINSTEM

WATERSHED DESCRIPTION

The Raritan River, its tributaries and branches drain an area totaling over 1,100 square miles. The Raritan River basin is the largest river basin located entirely within New Jersey. The mainstem, 31 miles long, drains parts of Somerset, Union, Middlesex and Monmouth Counties before emptying into the Raritan Bay. Tides affect this waterway to the Fieldsville Dam upstream of New Brunswick. The Delaware and Raritan Canal flows alongside the Raritan River from the confluence of the Millstone River to New Brunswick. Major tributaries to the Raritan are the North and South Branches, Millstone River, South River, Green Brook and Lawrence Brook. The section of the Raritan basin reviewed here is the mainstem of the Raritan River from the confluence of the North and South Branches to Raritan Bay and associated small tributaries. For the most part, this drainage area is densely populated, with the centers of population in Plainfield, New Brunswick, Perth Amboy, Edison, South Amboy, Sayreville, Bound Brook, Somerville, Manville, Piscataway, Metuchen and Bridgewater. There are two low dams in the river, Fieldsville Dam and Calco Dam. Among the many small recreational lakes and ponds in this area are Watchung Lake, Surprise Lake, Spring Lake and Green Brook Pond (all manmade).

The land use in this watershed is primarily urban/suburban, with industrial and commercial centers throughout. There are about 73 NJPDES permitted dischargers here, some 12 of which are municipal and the remainder industrial/commercial. Fifteen discharges are to Raritan Bay and tributaries. Classifications of waters in the Lower Raritan River watershed are FW-2 Trout Maintenance, FW-2 Nontrout and SE-1.

WATER QUALITY ASSESSMENT

Physical/Chemical Water Quality

Locations: Raritan River at Manville and at Queens Bridge

Dissolved Oxygen: Acceptable at both locations.

Temperature: No violations of the upper criterion for non-trout waters.

Nutrients: At Manville, inorganic nitrogen is marginal; median value is 1.12 mg/l. Total phosphorous is slightly elevated, with 26% of samples exceeding the criterion. The median value was 0.1 mg/l.

At Queens Bridge in Bound Brook, inorganic nitrogen is elevated, with a median value of 2.1 mg/l. Total phosphorous is also elevated, with 94% of samples exceeding the criterion. The median value was 0.22 mg/l.

Raritan River continued:

Bacteria: Acceptable levels were recorded at Manville. The geometric mean was 141 MPN/100 ml, with 10% of samples exceeding the 400 MPN/100ml criterion.

At Queens Bridge, the sanitary quality appears lower, with the geometric mean at 269 colonies/100 ml; 56% of samples exceeded 400 colonies/100 ml. It must be noted here that the analytical methods for assessing bacterial density differ between these two locations. The Queens Bridge site is part of the US Geological Survey National Stream-Quality Accounting Network and, as such, employs a membrane filter method to analyze for fecal coliform bacteria in contrast to the EC Broth method employed for samples collected at the USGS/DEP Cooperative Network. Caution should be exercised in comparing the results of the two locations with one another as the same water sample could yield **somewhat different** results if one or the other of the analytical methods were employed.

Heavy Metals: At Manville, one lead sample (of four) approached but did not exceed the chronic criteria for aquatic life support.

Summary: The mainstem Raritan at Manville shows mild nutrient elevations which increase notably downstream at Queens Bridge. Bacterial quality seems to follow a similar pattern, marginally acceptable at Manville degrading to poorer sanitary conditions at Queens Bridge.

Prior to 1991, monitoring at Raritan indicated generally good water quality, similar to conditions recorded at Manville during the same period of review (1986 through 1990). Current conditions at Manville are similar to those recorded in the earlier assessment with the exception that occasional violations of unionized ammonia observed in the late 1980s were no longer observed after 1990. Conditions at Queens Bridge are identical to conditions observed between 1986 and 1990. Significant improvements in the Raritan River at Bound Brook were observed since the beginning of the 1980s and are attributed to the gradual reduction in discharge flows from the American Cyanamid facility. In 1985 the company's discharge had been eliminated with flows being transferred to the Somerset Raritan Valley SA treatment plant.

Biological Monitoring

Macroinvertebrate assessments in the Raritan River at Millville and Piscataway show moderately impaired conditions. Moderately impaired conditions were found in many of the assessed tributaries as well, including Dukes Brook, Peters Brook and Middle Brook. Green Brook is assessed to be severely impaired in Watchung Township, but at Seeley's Mill and below conditions improve to moderately impaired. See the Biological Assessment Table located at the end of this section for details regarding macroinvertebrate assessments within the watershed.

POINT SOURCE ASSESSMENT

The Raritan River is believed to be heavily influenced by both point and nonpoint sources. The elimination of the American Cyanamid discharge, as

noted above, has resulted in improvements in river water quality. No point source discharges have been listed as being currently under an enforcement action by the Department within the watershed.

The following wastewater treatment plants have been eliminated or upgraded and/or expanded (and if so, have renewed operation):

FACILITY	LOCATION	RECEIVING STREAM	COMMENTS
Manville STP	Manville Boro., Somerset Co.	Raritan River	Facility eliminated on June 1992.
N.J. Transit	Raritan Boro., Somerset Co.	Gaston Bk.	Facility has completed an upgrade of its wastewater treatment system via an ACO executed with the Department.
Borough of Sayreville	Middlesex Co.	Cheezequake Cr.	Required to upgrade its treatment plant backwash system
Aberdeen Twp. MUA	Aberdeen, Monmouth Co.	Raritan Bay	ACO required the termination of discharges from the three failing treatment plants. The discharge from these three plants are conveyed to the Bayshore Regional Sewage Authority for treatment and discharge to the Atlantic Ocean.

NONPOINT SOURCE ASSESSMENT

The Raritan River is reported to be impacted by nonpoint source pollution from urban/suburban development throughout its length. Additional nonpoint source pollution from landfill leachate is suspected in the lower portions of the river. Runoff from urban surfaces, storm sewers and roadways is believed to be an increasing problem in the watershed. Additional contamination sources are suspected from the land disposal of wastewater and from local chemical spills.

Construction activities were noted to be active in the Peters Brook area of the Upper Raritan watershed and in Franklin and Warren Townships in the Lower Raritan watershed. The result of this urbanization is an increase in the nutrient and sediment loads which the river must absorb, as well as an increase in local flooding.

A number of hazardous waste sites are located in the Raritan River watershed, many of which are on the National Priority List. Sites that have been reported as impacting surface waters include: Blue Spruce International (Raritan River), Chemical Insecticide Corporation (Mill Creek), Horseshoe Road Dump (Raritan River), KinBuc Inc. (Edmonds Creek and Raritan River), Renora Inc. (Mill Creek) and Rhone-Poulenc (Raritan River).

DESIGNATED USE ASSESSMENT

The Raritan River fully supports primary contact recreation (swimming) at Manville but fails to support the designated use at Bound Brook due to elevated fecal coliform bacteria.

The freshwater portions of the Raritan River, up and downstream of the confluence with the Millstone River, are considered to partially support the aquatic life support designated use. Those portions of Raritan Bay monitored by New Jersey for suitability for shellfish harvesting are classified as either prohibited or special restricted (requiring special processing) depending upon

location. In addition, there is a fishing advisory in effect because of PCB contamination in certain fishes in the tidal section of the river.

SOUTH RIVER

WATERSHED DESCRIPTION

The South River drains an area of 133 square miles. It begins at Duhernal Lake in Spotswood, Middlesex County, and flows through the county to the Raritan River at Sayreville. Tides affect this 10 mile waterway from Duhernal Lake to the outfall into the Raritan River. The South River is formed by the confluence of Manalapan (20 miles long) and Matchaponix (15 miles) Brooks. Other tributaries include Deep River and Tennants Brook. The major impoundments are Duhernal Lake and Lake Manalapan. The population of this drainage area is concentrated in Spotswood, Old Bridge, East Brunswick and Sayreville. Sub-watersheds include Manalapan Brook, Matchaponix Brook and South River.

Agriculture and forests probably still account for the major portion of land uses in the upper watershed (Manalapan and Matchaponix Brooks), but there is much new industrial and residential development in these watersheds, with older existing development along the South River. There are about 5 NJPDES permitted dischargers in the watershed; all are municipal. Waters have been classified FW-2 Nontrout and SE-1.

WATER QUALITY ASSESSMENT

Physical/Chemical Water Quality:

Location: Manalapan Brook near Manalapan

Dissolved Oxygen: Acceptable.

Temperature: No violations of the upper criterion for non-trout waters.

Nutrients: Inorganic nitrogen is acceptable; median value is 0.83 mg/l. Total phosphorous is mildly elevated, with 85% of samples exceeding the 0.05 mg/l criterion. The median value was 0.08 mg/l.

Bacteria: Very low bacterial levels were recorded. The geometric mean was 50.6 MPN/100 ml and only one of twenty samples exceeded the 400/100ml criterion.

Heavy Metals: Due to their low hardness, these waters are sensitive to relatively low levels of metal with regard to toxicity to aquatic life. One of three lead samples (at 2 ug/l of total recoverable) exceeded the chronic water quality criteria for aquatic life support.

Location: Matchaponix Brook at Spotswood

Dissolved Oxygen: Acceptable.

Temperature: No violations of the upper criterion for non-trout waters.

Nutrients: Inorganic nitrogen is unusually high at this location; the median value is 3.4 mg/l, with 6 out of 16 records being over 5 mg/l, with one exceeding the 10 mg/l drinking water standard. Total phosphorous is mildly elevated, with 45% of samples exceeding the 0.05 mg/l criterion, and 15 % exceeding 0.1 mg/l. The median value was 0.05 mg/l.

Bacteria: Bacterial levels were low; the geometric mean was 63.5 MPN/100 ml and only two of twenty sample exceeding the 400 MPN/100ml criterion.

Heavy Metals: Two of five lead samples exceeded the chronic water quality criteria for aquatic life support. Also, one of five zinc samples exceeded the chronic zinc criterion and closely approached the acute criterion for aquatic life support.

Water Quality Summary: Both the Manalapan and the Matchaponix Brooks have very good sanitary quality based upon fecal coliform levels. Both sites have slight to moderately elevated phosphorus levels, but these sites notably differ with regard to inorganic ($\text{NO}_2 + \text{NO}_3$) nitrogen levels. While the Manalapan has acceptable levels, the levels recorded in the Matchaponix are extremely elevated. The Manalapan water is very soft and hence is very sensitive to heavy metals, even in relatively low levels. Both monitoring locations suggest a problem with excessive lead, while Matchaponix Brook seems to also have a potential zinc problem.

Present water quality within the Manalapan is similar to conditions observed during the prior assessment, 1986 through 1990. Formerly the Manalapan was also monitored at Spotswood (discontinued in 1991) where conditions were found to be similar to those recorded at Manalapan. Conditions in Matchaponix Brook are also similar to those recorded during the previous review period.

Biological Monitoring

See the Biological Assessment Table located at the end of this section for details regarding macroinvertebrate assessments within the watershed. The monitored waters within the South River watershed are, with some exceptions, moderately impaired. These included the Matchaponix Brook, Pine Brook, Barclay Brook, Deep Run, Millford Brook and Tepehemus Brook.

Manalapan Brook is moderately impaired in the lower end and severely impaired within the central section surrounding Monroe Township. The upper-most portion of the river is assessed as a mix of non-impaired and moderately impaired sections. The lower portion of McGellairds Brook is assessed as severely impaired while the upper reaches are moderately impaired. Weamaconk Creek shows the reverse, with the upper portion being severely impaired and the lower section moderately impaired.

Biological monitoring within the Lawrence Brook watershed (neighboring the South River) shows moderately impaired conditions throughout the watershed.

POINT SOURCE ASSESSMENT

Manalapan Brook contains a few small wastewater discharges that may have localized impacts on water quality. Matchaponix Brook, however, receives wastewaters from a regional sewage treatment system in the headwaters area. This facility may be responsible for the high nutrient (nitrogen) concentrations found in the brook. No facilities are reported to be under enforcement action within the watershed.

The following wastewater treatment plant has been upgraded and has renewed operation:

FACILITY	LOCATION	RECEIVING STREAM	COMMENTS
Dept. of Corrections Jamesburg Training Facility for Boys	Jamesburg, Middlesex Co.	Matchaponix Brook	ACO required the correction of violations of nutrients being discharged from the treatment plant

NONPOINT SOURCE ASSESSMENT

Land uses in this watershed are primarily agricultural and suburban/commercial, with significant amounts of residential and commercial development continuing to take place. Agricultural soil erosion in the watershed is considered to be moderate by the Natural Resource Conservation Service. Manalapan and Matchaponix Brooks appear to receive nonpoint source pollution primarily from areas of suburban development. A major threat to the fisheries of both streams is the runoff coming from acid-producing soils of the region. When exposed to air and water, as during construction, these soils produce sulfuric acid which, when washed into rivers in runoff, can cause a sudden and sometimes long lasting pH depression. This, in turn, can have a deleterious effect on the aquatic biota of the receiving stream. In addition, increasing amounts of construction activity coupled with urban surface and road runoff have all contributed to silt loadings, flooding, and a reduction in the quality of fish habitat. This is reported to be severe in the Manalapan Township region of Monmouth County. Runoff from construction sites is reported to be a severe and increasing problem along Matchaponix Brook. Also judged to be impacting these two brooks are septic tank leachate and stream bank destabilization. Agricultural impacts to both brooks are evaluated to be largely sediment loads coming from local cropland runoff.

The South River receives nonpoint source pollution largely from developed lands. Construction activities and severe stream bank modification are known to have contributed to silt loads and local flooding. Increasing amounts of runoff from urban surfaces, roads and storm sewers are suspected of contributing to nutrient and sediment loading. In addition, this stream is believed to be threatened with toxic contamination from the Burnt Fly Bog waste disposal site located near Deep Run, a tributary to the South River.

A number of hazardous waste sites are found in the South River watershed, many of which are on the National Priority (Superfund) List. Two sites are suspected of contaminating local surface waters: the Sayreville Landfill, which is adjacent to the South River (releasing pesticides and volatile organics), and the Viking Terminal, also adjacent to the South River (containing mirex).

DESIGNATED USE ASSESSMENT

Based upon fecal coliform bacteria, both the Manalapan Brook at Manalapan and the Matchaponix at Spotswood are assessed as fully supporting the primary contact (swimming) designated use.

The monitored waters within the South River watershed are, with some exceptions, partially supporting the aquatic life designated use. See the description of biological monitoring above for details as to full support (non-impairment) and no support (severe impairment).

BIOLOGICAL ASSESSMENT TABLE: AREA 9

Mgt Area	Watershd	Site ID	Water Body	Location	Municipality	Sample Date	Biological Impairment Rating
9	30	AN0375	Dukes Bk	Dukes Pkwy	Hillsborough Twp	Sep 15, 1993	moderately impaired
9	30	AN0376	Peters Bk	Rt 28	Somerville	Sep 14, 1993	moderately impaired
9	30	AN0377	Raritan R	abv Millstone R conf	Manville	Jul 11, 1990	moderately impaired
9	30	AN0415	Cuckels Bk	Rt 28	Bridgewater Twp	Sep 14, 1993	moderately impaired
9	30	AN0416	Middle Bk W Br	Crim Rd	Bridgewater Twp	Sep 15, 1993	moderately impaired
9	30	AN0417	Middle Bk W Br	Chimney Rock Rd	Bridgewater Twp	Sep 15, 1993	moderately impaired
9	30	AN0418	Middle Bk E Br	Green Valley Rd	Warren Twp	Sep 14, 1993	severely impaired
9	30	AN0419	Middle Bk E Br	Gilbride Rd	Bridgewater Twp	Sep 14, 1993	non-impaired
9	30	AN0420	Middle Bk	Talmage Ave	Bridgewater Twp	Sep 14, 1993	non-impaired
9	30	AN0420	Middle Bk	Talmage Ave	Bridgewater Twp	Sep 12, 1994	non-impaired
9	30	AN0420	Middle Bk	Talmage Ave	Bridgewater Twp	Dec 6, 1994	non-impaired
9	30	AN0420	Middle Bk	Talmage Ave	Bridgewater Twp	Mar 22, 1995	moderately impaired
9	30	AN0420	Middle Bk	Talmage Ave	Bridgewater Twp	Jun 20, 1995	moderately impaired
9	30	AN0421	Green Bk	Raymond Ave	Watchung Twp	Feb 27, 1992	severely impaired
9	30	AN421A	Green Bk	New Providence Rd	Seeleys Mill	Feb 27, 1992	moderately impaired
9	30	AN421B	Green Bk	Appletree Rd	Watchung	Feb 27, 1992	severely impaired
9	30	AN0422	Stony Bk	Westend Ave	N Plainfield	Feb 26, 1992	moderately impaired
9	30	AN422A	Stony Bk	Sunlit Dr	Watchung	Feb 27, 1992	moderately impaired
9	30	AN0423	Green Bk	Clinton Ave	Plainfield	Feb 26, 1992	moderately impaired
9	30	AN0424	Bound Bk	Bound Bk Rd	Middlesex	Feb 26, 1992	moderately impaired
9	30	AN424A	Cedar Bk	Cedar Bk Ave	S Plainfield	Feb 26, 1992	severely impaired
9	30	AN0425	Ambrose Bk	Raritan Ave	Middlesex	Feb 25, 1992	moderately impaired
9	30	AN425A	Ambrose Bk	Behmer Rd	Piscataway	Feb 25, 1992	severely impaired
9	30	AN425B	Ambrose Bk	School St	N Stelton	Feb 25, 1992	non-impaired
9	30	AN0426	Green Bk	Main St	Bound Bk	Feb 25, 1992	moderately impaired
9	30	AN426A	Green Bk	Sebrings Mill	Green Bk	Feb 25, 1992	moderately impaired
9	30	AN0427	Raritan R trib	Rt 527	S Bound Bk	Oct 5, 1993	moderately impaired
9	30	AN0428	Raritan R	Fieldville Dam (I287)	Piscataway	Jul 11, 1990	moderately impaired

BIOLOGICAL ASSESSMENT TABLE continued:

Mgt Area	Watershd	Site ID	Water Body	Location	Municipality	Sample Date	Biological Impairment Rating
9	30	AN0429	Mile Run	Rt 527	New Brunswick	Oct 5, 1993	moderately impaired
9		AN0430	Lawrence Bk	Ridge Rd	Monmouth Jct	Sep 30, 1993	moderately impaired
9		AN0431	Lawrence Bk	Davidsons Mill Rd	S Brunswick Twp	Sep 30, 1993	moderately impaired
9		AN0432	Oakeys Bk	Davidsons Mill Rd	S Brunswick Twp	Sep 30, 1993	moderately impaired
9		AN0433	Ireland Bk	Riva Rd	nr Patricks Cor	Sep 30, 1993	moderately impaired
9		AN0434	Lawrence Bk	Riva Rd	Milltown	Sep 30, 1993	moderately impaired
9		AN0435	Sawmill Bk	Ryders Ln	Milltown	Sep 30, 1993	moderately impaired
9		AN0436	Mill Bk	Woodbridge Ave	Piscataway	Jul 14, 1994	moderately impaired
9		AN0437	Manalapan Bk	Rt 524	Ely (Millstone Twp)	Sep 29, 1993	non-impaired
9		AN0437	Manalapan Bk	Rt 524	Ely (Millstone Twp)	Dec 16, 1993	non-impaired
9		AN0437	Manalapan Bk	Rt 524	Ely (Millstone Twp)	Mar 15, 1994	non-impaired
9		AN0437	Manalapan Bk	Rt 524	Ely (Millstone Twp)	Jun 8, 1994	moderately impaired
9		AN0437	Manalapan Bk	Rt 524	Ely (Millstone Twp)	Mar 24, 1995	non-impaired
9		AN0438	Manalapan Bk	Rt 33	Millhurst	Sep 29, 1993	moderately impaired
9		AN0439	Manalapan Bk	Federal Rd	Monroe Twp	Sep 29, 1993	severely impaired
9		AN0440	Manalapan Bk	Old Forge Rd	Helmetta	Oct 7, 1993	moderately impaired
9		AN0441	Weamaconk Ck	Rt 9	Freehold	Sep 15, 1993	severely impaired
9		AN0442	Wemrock Bk	Wemrock Rd	Freehold Twp	Sep 15, 1993	moderately impaired
9		AN0443	Weamaconk Ck	Rt 522	Englishtown	Sep 15, 1993	moderately impaired
9		AN0444	McGellairs Bk	Rt 9	Freehold Twp	Sep 15, 1993	moderately impaired
9		AN0445	Tepehemus Bk	Tennent Rd	Manalapan Twp	Sep 14, 1993	moderately impaired
9		AN0446	Milford Bk	Pease Rd	Manalapan Twp	Sep 14, 1993	moderately impaired
9		AN0447	McGellairs Bk	Rt 527	Englishtown	Sep 14, 1993	severely impaired
9		AN0448	Matchaponix Bk	Rt 527	Manalapan Twp	Sep 14, 1993	moderately impaired
9		AN0449	Pine Bk	Pension Rd	Clarks Mills	Sep 1, 1993	moderately impaired
9		AN0450	Barclay Bk	Rt 527	Madison Twp	Sep 1, 1993	moderately impaired
9		AN0451	Matchaponix Bk	Texas Rd	Texas	Sep 14, 1993	moderately impaired
9		AN0452	Iresick Bk	Rt 527	Old Bridge Twp	Sep 1, 1993	severely impaired
9		AN0453	Deep Run	Rt 9	Madison Twp	Aug 31, 1993	moderately impaired